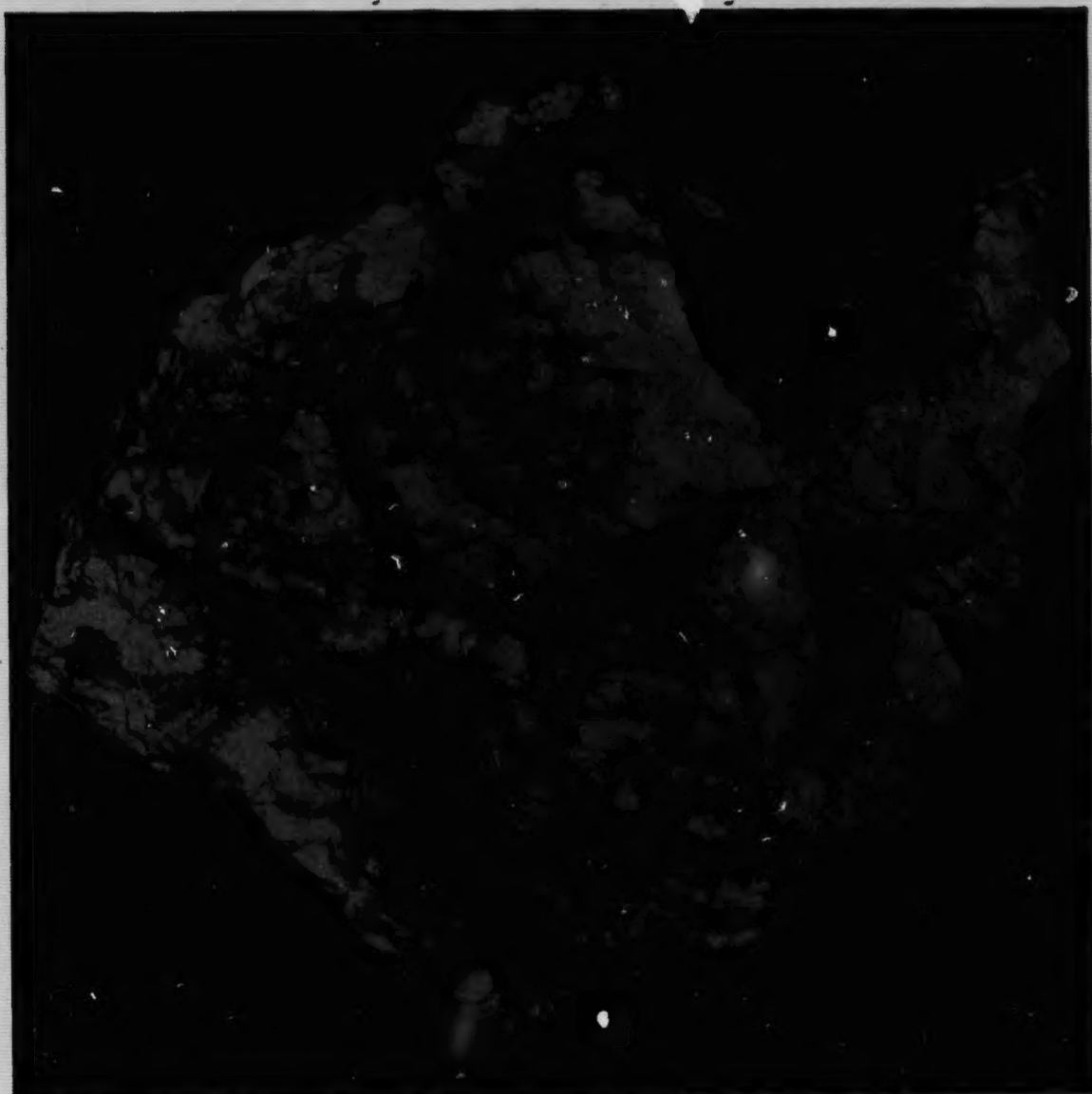


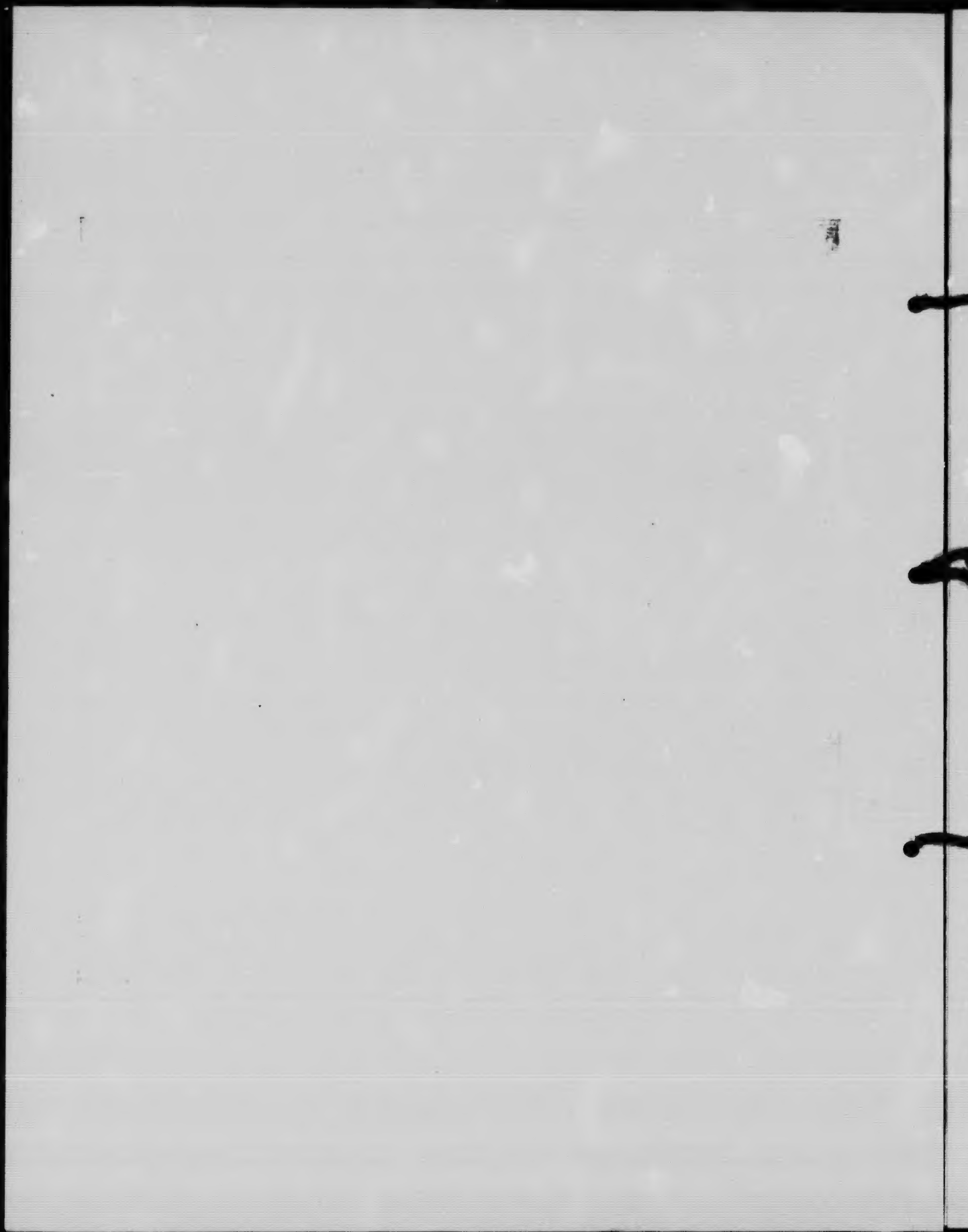
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)



Gold Ore from Croesus Mine, Northern Ontario

(Actual Size)

This Ore is Over One-Third Gold



Mineral Wealth Along the Temiskaming and Northern Ontario Railway

Itinerary Their Excellencies' Visit to Greater Ontario—September, 1917.

- Sunday 23rd.— Leave Ottawa at night.
- Monday 24th.— Arrive North Bay in morning. Run North and arrive Cobalt 2 o'clock
—presentation of Address of welcome by Mayor and Aldermen.
2.30 p. m. leave in automobiles for trip through Town of Cobalt and Mining District. Visit Mines and Mills.
5.30 p. m. Afternoon tea at Crown Reserve Mine.
6.30 p. m. Return to train for Dinner.
8.30 p. m. Reception at City Hall.
Run to North Cobalt Siding for night.
- Tuesday 25th.— Arrive at New Liskeard 10 a. m.—Drive in automobiles to Public Library, where Address of welcome will be presented by Mayor and Council.
10.30 a. m. Automobile trip through Town and Agricultural District.
1.30 p. m. Return to train.
2-3 p. m. Luncheon at Grand Union Hotel
3 p. m. leave New Liskeard for Haileybury, either in automobiles or boat.
4-6 p. m. Boat trip on Lake.
6 p. m. Automobiles through the Town to Haileybury station.
8.30-10.00 p.m. Public reception at Armouries. School children and returned soldiers will be present. Presentation of Address of Welcome by Mayor and Council.
Run to Timmins during the night.
- Wednesday 26th.—Timmins—morning—Presentation of Address of welcome by Mayor and Council. Visit to Hollinger Mine and Mill. Luncheon to the party at Hollinger Club House. 2 p.m. leave for Iroquois Falls—Presentation of Address of welcome by Mayor and Council of Iroquois Falls. Trip through Abitibi Power & Pulp Co.'s mill, occupying about 2 hours. Planting of tree in Public Park. Arrive Cochrane about 8 p.m. Public reception at Union Station. Address of Welcome by Mayor and Council. Musical programme by school children and presentation of lockets to returned soldiers on behalf of citizens. Display of agricultural products.
- Thursday 27th.— Daylight run Cochrane to Kapuskasing via Canadian Government Railways—visit Internment Camps, Soldiers Settlements et al.—Return to Cochrane.
- Friday 28th.— Daylight run from Cochrane to Temagami. Stop at Experimental Farm, Monteith.
Englehart—Presentation of Address of Welcome by Mayor and Council, and bouquet to Her Excellency, by Women's Institute.
Arriving Temagami Friday evening.
- Saturday 29th.— Run up Lake Temagami to "Cochrane Camp."
- Sunday 30th.— Return trip on Lake Temagami in afternoon arriving North Bay Sunday evening for movement to Sudbury via C. P. Ry.
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Mineral Wealth along the Temiskaming and Northern Ontario Railway

IN 1902 the Ontario Government decided to build a colonization railroad northward from the Canadian Pacific Railway at North Bay, for the purpose of opening up what is known as "The Clay Belt" of Northern Ontario. With the meagre information then available, it required considerable courage and optimism to foresee this colonization railroad as a paying investment, even in the distant future.

To reach the Southern border of the Clay Belt required the construction of over a hundred miles of railway, through a country whose only apparent promise of future freight revenue was from the lumbering industry. Before the line was complete, however, a discovery was made which changed the whole aspect of the Government investment. Almost within sight of the new farm lands of Temiskaming, the first silver finds were made at Cobalt in the Autumn of 1903 by members of the railway construction parties. From this time forward the mining industry became the most important revenue producer for the Government Railway; and it is likely to hold this lead for many years to come.

The Cobalt silver deposits proved to be very rich, but most investors were skeptical. Several small shipments of silver ore were made in 1904, but it was not till the following year that real mining operations were commenced. Interest in the new camp rapidly increased, till in 1905 it reached the proportion of a boom. The District was easily accessible and it was a novelty for investors to be able to reach a thriving mining camp in a Pullman car in little more than twenty-four hours of leaving New York City. The stocks of the producing companies became inflated beyond their real value and carried with them the usual wild-cat schemes. The inevitable crash and slump followed, and for some years afterwards speculation in mining stocks in this district was practically dead.

In the meantime the legitimate industry was making steady and rapid progress, as may be seen from the accompanying table of production.

Table No. 1. Silver Production of the Cobalt Cam,

Year	Ounces	Value
1904	206,875	111,887
1905	2,451,356	1,360,503
1906	5,401,766	3,667,551
1907	10,023,311	6,155,391
1908	19,437,875	9,132,378
1909	25,897,825	12,461,576
1910	30,645,181	15,478,047
1911	31,507,791	15,953,847
1912	30,243,859	17,408,935
1913	29,681,975	16,553,981
1914	25,162,841	12,765,461
1915	23,730,839	11,742,463
1916	20,000,000	13,000,000
	254,391,494	\$135,693,020

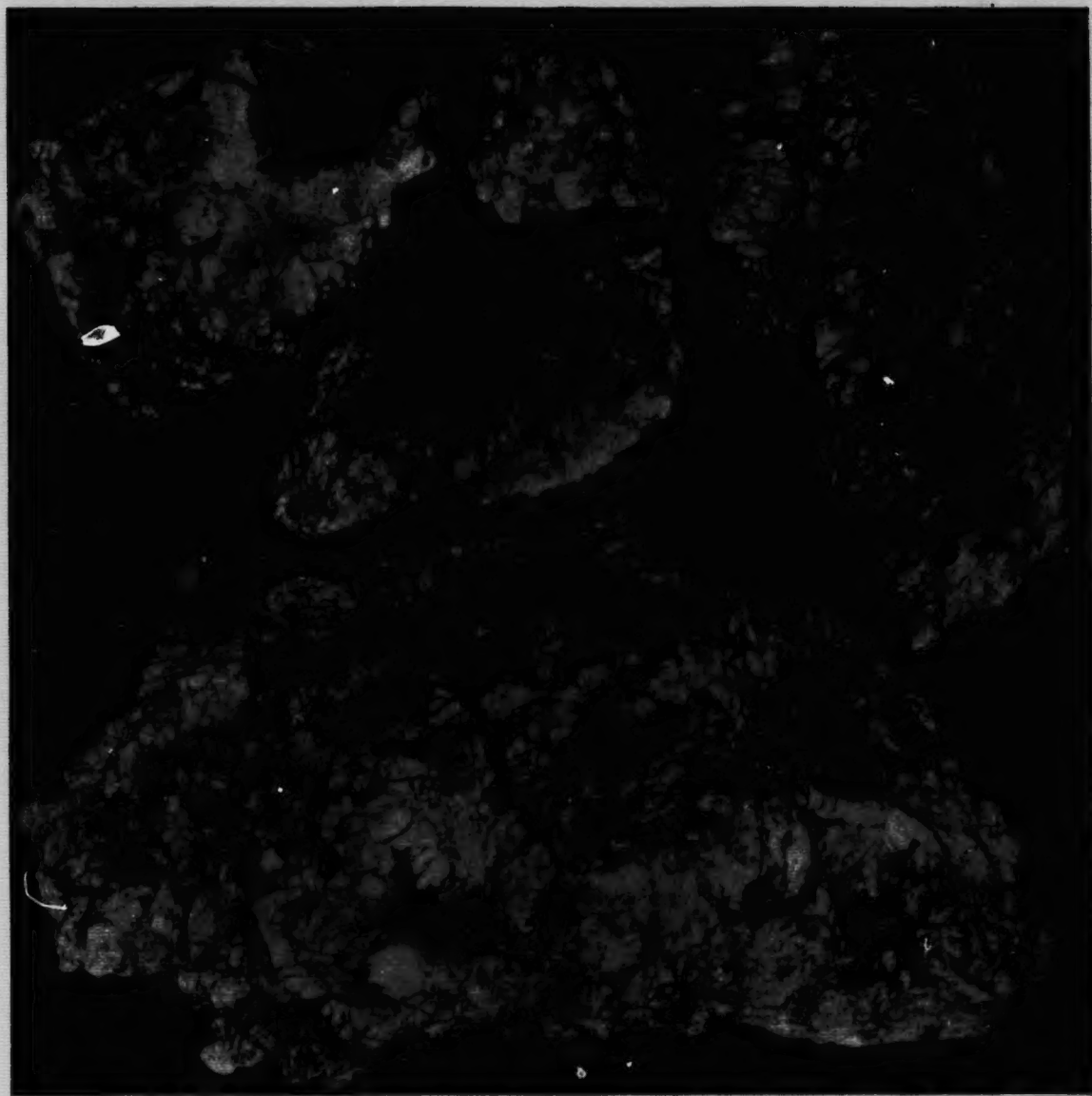
Mineral Wealth Along the Temiskaming and Northern Ontario Railway

The above figures may be expressed in another form in the statement that the Cobalt District is now producing silver at the rate of $2\frac{1}{2}$ tons per working day, or going back fourteen years, it has produced over two tons of pure silver for every working day since the camp was discovered in 1903.

The silver ores of Cobalt are complex and there was no place in Eastern Canada to treat them, so that all the early shipments went to smelters in the Eastern United States, only the richer ores being shipped. The ores contained other valuable constituents besides silver, and soon a number of Canadian enterprises were started, of which the two largest are now operating on an extensive scale, producing not only refined silver, but refined arsenic, cobalt and nickel, either as metals or in other saleable forms. The principal source of cobalt oxide used to be New Caledonia, but since these Canadian refineries have entered the market, they have driven out all competitors.

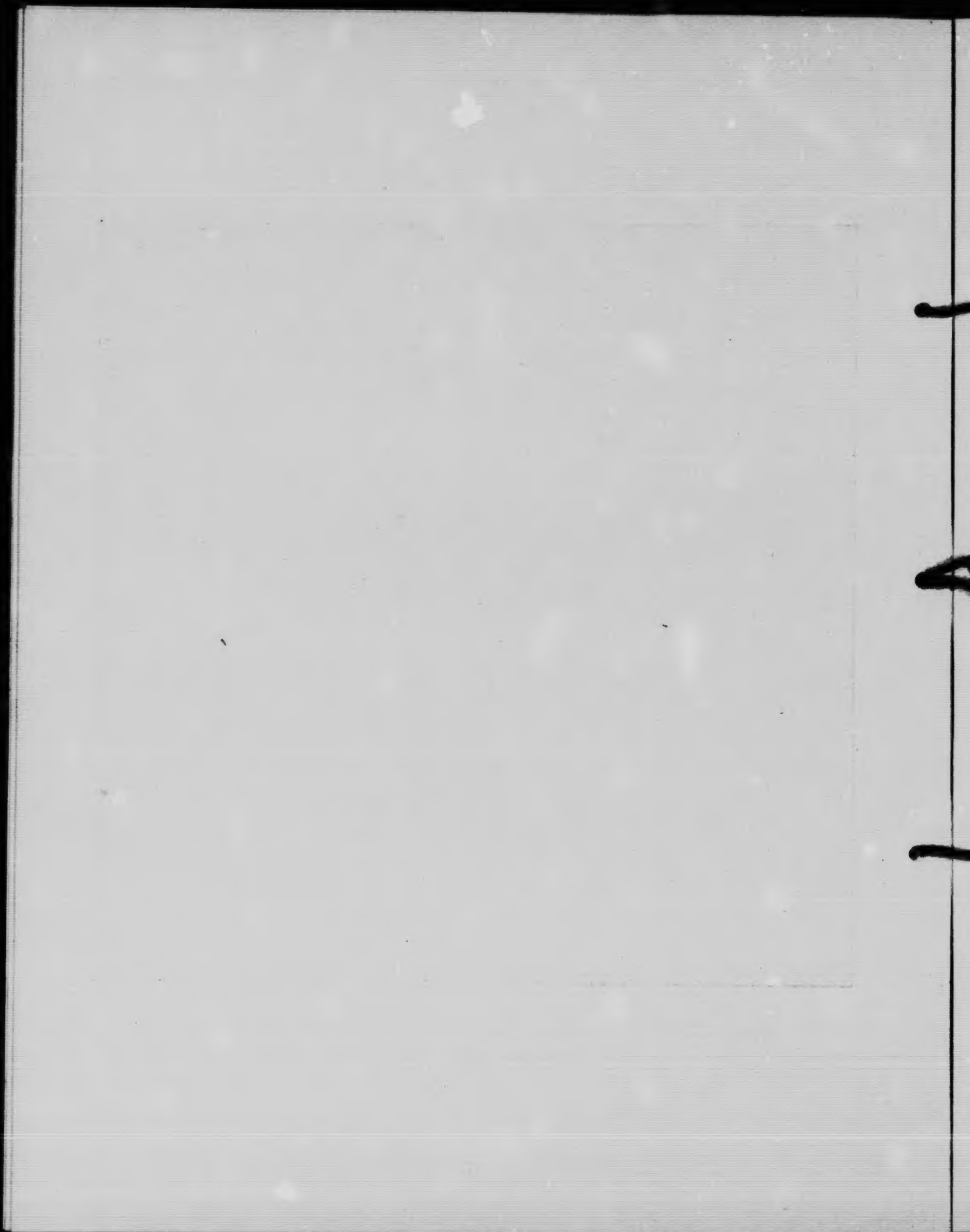
The silver bearing veins are narrow, but as they were taken out and mining development became more extensive, it was found that there still remained a large tonnage of low grade silver-bearing material that could not pay the high freight and smelter charges without previous treatment. The first concentrating mill started operations in 1907 and others quickly followed, till at the present time there are fifteen operating mills. The tonnage of ore treated increased from 50,000 in 1907 to 635,000 tons in 1916. The average reduction in weight due to concentration is from 45 to 1, and as the percentage of values recovered is about 80, the increased value per ton of the concentrate is about 36 times that of the original ore. An important metallurgical advance has been made by the introduction of Oil-Flotation. It is not likely that this method of concentration will supersede the standard method already in use in the camp, but in many cases it can be made a valuable addition to the existing plants and the extraction bettered with only a small additional cost.

The principle of oil flotation may be briefly stated as follows. If to a finely ground pulp in water certain oils are added in small quantities and then aerated it is found that the oils have an affinity for the metallic particles which they do not have for the gangue. The foam made by the oil carries off the metallic particles thus making a concentrate which while not by any means perfect is still quite valuable to the Cobalt Camp, as silver is one of the metals that will thus float. The oils mostly used in Cobalt are Pine Oil, Creosote and Coal Tar. Recently it has been found the expensive pine oil which has to be imported can be replaced by hardwood creosote oil of Canadian production. The adoption of oil flotation will not only make available for treatment large tonnages of tailings now being produced by the mills, but many tailings-dumps will also be retreated at a profit. The tonnage of such old tailings dumps will amount to about $2\frac{1}{2}$ million tons. If



Gold Ore from Croesus Mine, Northern Ontario

The Specimens are much larger than here shown. The five pieces together weigh about 85 lbs. and contain gold and silver valued at \$9,986.



Mineral Wealth Along the Temiskaming and Northern Ontario Railway

we assume that at least 4 ounces per ton can be saved at a gross cost of 2 ounces we have a profit on this material alone of nearly four million dollars at the present price of silver. Oil flotation will also make lower grade material treatable at a profit, increasing the available tonnage and thus lengthening the life of the Camp.

Cyanidation has been introduced to a greater or less degree in several of the mills so that considerable bullion is now produced instead of a concentrate which had to be shipped out of the district for further refining.

The mills mentioned were all for the treatment of low grade ores and in the meantime all the high-grade ores including concentrates were shipped to the smelters. Two companies, the Nipissing and the Buffalo Mining Companies, determined to treat their high-grade ore at the mines, in order that they might have only bullion to ship. With this end in view each erected a high-grade mill. The method employed was a combination amalgamation and cyanide treatment, about 97% of the extraction being made by amalgamation. The tendency has thus been more and more towards the complete refining of the silver at the mine, so that now four of the leading companies ship out their whole product in the form of refined silver bullion, while some of the remaining companies ship much of their product as bullion. With these two high-grade mills in Cobalt, and with the Coniagas and Deloro Smelters operating in Southern Ontario, most of the Cobalt ores are now treated in Canada as is shown by a statement covering the calendar year 1915.

Cobalt Mills, Amalgamation and Cyanide.....	39%
Southern Ontario Smelters.....	45%
United States Smelters.....	16%

	100%

With mining costs normal, but the grade of much of the ore unusually high, the profits were necessarily great. It has even paid some companies to pump out a whole lake, in order to recover the silver from the rich veins in the lake bottom. Twenty-four companies have paid in dividends aggregating \$67,460,000 or 47% of the gross production.

As soon as the value of the Cobalt Camp began to be understood it was only natural that prospectors should spread out in all directions from it seeking similar deposits. Their work bore good results for other silver districts, Gowganda, Casey Township and South Lorrain were found, though none has yet been discovered comparable to Cobalt. As the prospectors pushed north towards the height-of-land, tales of gold discoveries be-

Mineral Wealth Along the Temiskaming and Northern Ontario Railway



Gold-Bearing Quartz in a Porcupine Gold Mine. Porcupine, Ontario, Canada.

Mineral Wealth Along the Temiskaming and Northern Ontario Railway



A High Grade Silver Vein in a Cobalt Silver Mine. Cobalt, Ontario, Canada.

Mineral Wealth Along the Temiskaming and Northern Ontario Railway

gan to come in. The early gold finds all proved disappointing and the old saying that "gold in paying quantities would never be found in Ontario" was often heard repeated. The history of early gold mining in Western Ontario, as in the Lake-of-the-Woods district, tended to strengthen the idea.

In the Autumn of 1900 promising gold claims were staked in the Porcupine Lake District, 100 miles north of Cobalt and 30 miles West of the Government Railway. In the early winter the trail was crowded with an eager throng with pack-sack and toboggan, an occasional dog team being seen, and a genuine gold rush was in progress. A sleigh road was soon cut through to the new camp and the trip from the railway, that had previously taken three or four days to walk, could be made in one day by driving. Before Spring practically every claim for miles around the early discoveries was staked. It was fortunate that the best discoveries soon passed into strong financial hands, so that in the troublous days that followed, before actual production could begin, sufficient capital was available to continue development, without interruption. For some time progress was slow. Supplies had to be put in during the winter to run for the rest of the year.

Table No. 3. Total Production, Cobalt Mines, 1904-1916

Year	Nickel		Cobalt		Arsenic		Silver		Total
	Tons	Value	Tons	Value	Tons	Value	Ounces	Value	Value
		\$		\$		\$		\$	\$
1904	14	3,467	16	19,960	72	903	206,875	111,887	136,217
1905	75	10,000	118	100,000	549	2,693	2,451,356	1,360,503	1,473,196
1906	160		321	80,704	1,440	15,858	5,401,766	3,667,551	3,764,113
1907	370	1,174	739	104,426	2,958	40,104	10,023,311	6,155,391	6,301,095
1908	612		1,224	111,118	3,672	40,373	19,437,875	9,133,378	9,284,869
1909	766		1,533	94,965	4,294	61,039	25,897,825	12,461,576	12,617,580
1910	504		1,098	54,699	4,897	70,709	30,645,181	15,478,047	15,603,455
1911	392		852	170,890	3,806	74,609	31,507,791	15,953,847	16,199,346
1912	429	14,220	934	314,381	3,166	80,546	30,243,859	17,408,935	17,818,082
1913	377	13,326	821	420,386	3,663	64,146	29,681,975	16,553,981	17,051,839
1914	90	28,978	351	590,406	2,030	116,624	25,162,841	12,765,461	13,501,469
1915	35	28,353	206	383,261	2,490	148,379	24,746,534	12,135,816	12,695,809
1916	91	30,684	510	413,760	2,164	100,052	23,849,964	12,622,849	13,167,345
	3,916	130,202	8,723	2,858,956	36,201	816,035	259,257,153	135,809,222	139,614,415

The country was heavily wooded and the overburden frequently deep, so that prospecting was difficult and development slow. With the large number of men in the bush, clearing and prospecting, forest fires became a constant menace in the dry summer

Mineral Wealth Along the Temiskaming and Northern Ontario Railway

months. The summer of 1911 was particularly noteworthy in this respect. The season was very dry and hot, and fire after fire, threatened the mines, burning over the Hollinger property in May and culminating in the disastrous conflagration of July 11th, in which more than seventy lives were lost and almost all the mining and milling plants completely destroyed. It was fortunate that a branch line of the Government Railway had been completed into the district and opened for traffic just a few days previously. Fresh supplies were rushed in and construction on a larger scale was commenced immediately. From that time forward progress has been steady. Production started in 1910 with \$35,000 and had increased by 1916 to \$9,398,000, which is 92% of Ontario's gold production. Ontario now occupies first place as a gold-producing province with a production of \$10,339,000, which is 57% of the total production of Canada.

This is only the beginning. Development has been most encouraging, and each year adds to the extent of the known ore reserves. There are now eight producing companies of which four are already paying dividends. The three largest mines, the Dome, the Hollinger and the McIntyre are making the Porcupine District famous. The Hollinger mine has paid \$7,456,000. in dividends to the end of 1916, and with the dividends of the Dome and Porcupine-Crown a total of \$9,162,000. has already been reached. The McIntyre joined the list of dividend payers early in 1917 and the ore shoot it has developed on the 1000 foot level is one of the best in the district.

Other discoveries have also been made and new districts are coming into prominence. In Munro township, 50 miles east of Porcupine and 10 miles east from the railway, the Croes Gold Mine shipped two tons of ore that contained \$35,500 in gold, and this along with \$40,000 to be recovered by milling was produced by sinking a small shaft 110 feet deep. At a depth of 300 feet development continues to be satisfactory and a mill is now being erected. At Kirkland Lake, 35 miles further south east, and 7 miles from Swastika, on the railway, several mines are developing, of which the Tough-Oakes with its narrow rich gold veins, is already a dividend payer. At Boston Creek, 10 miles further south, rich gold ore has also been found, and already there is one small producer.

MINING OPERATIONS IN NORTHERN ONTARIO

The Railway forms a main artery from which prospecting activity takes its start. Thus along the Temiskaming and Northern Ontario Railway from Cobalt to Porquis Junction, a distance of 125 miles, it was noticeable this year that there was hardly a station from which some mining operations were not being carried on. Then the water routes radiating in all directions from the railway, make transportation

Mineral Wealth Along the Temiskaming and Northern Ontario Railway

comparatively easy to prospectors and they also supply power in abundance for the development of the mines.

The Ontario Government Railway was originally projected as a colonization railway but the finding of rich mineral lands in the country traversed opened it up much more rapidly than would otherwise have been the case. The happy combination of mineral and agricultural land in the district is of the greatest benefit to both, furnishing a cash market to the farmer at his very door. New districts are being reported from time to time and the older districts are looking better as work proceeds.

The established mining camps form nuclei from which prospecting parties are sent out. Thus the finding of Porcupine may be directly attributable to the Cobalt Camp, and it was due to the exertions of men from these camps that important discoveries have been made along the Transcontinental Railway and also in Northern Manitoba.

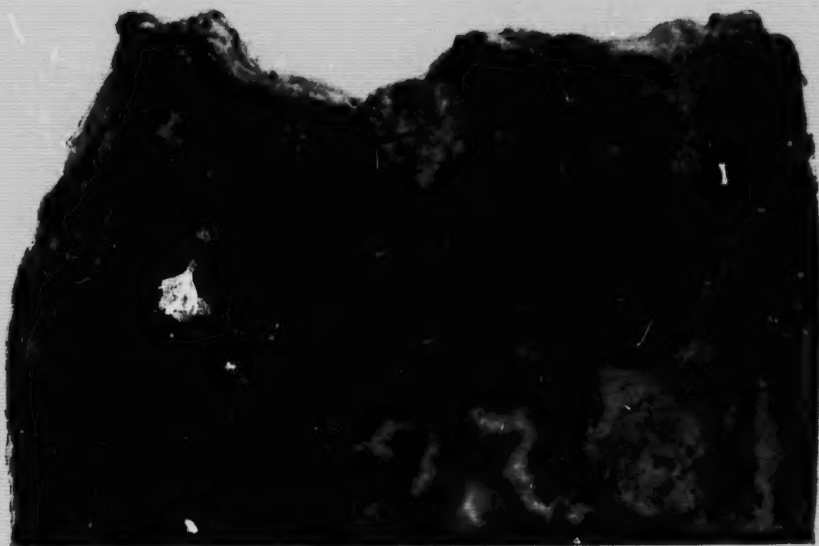
Anyone who looked over the unbroken forest of Northern Ontario a dozen years ago and predicted that this district would soon be producing over 20 millions in gold and silver annually would have been put down as a fantastic dreamer, but that figure is surpassed to-day by 3 million dollars and the output is continually increasing.

And yet, only a small portion of the country has been prospected. Running north-east and north-west from Cobalt and extending to the Arctic Ocean is the great Pre-Cambrian Shield, the basement formation of the Continent. It contains thousands of square miles and offers to prospectors Better Chances of Locating Valuable Mineral Deposits Than Can be Found in Any Other Country in The World.

ARTHUR A. COLE,

MINING ENGINEER.

Mineral Wealth Along the Temiskaming and Northern Ontario Railway



Silver Ore From Cobalt, Ontario, Canada.
